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ABSTRACT

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A COMPARISON OF READING COMPREHENSION PROCESSES IN GOOD AND POOR COMPREHENDERS

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Abstract

This paper critically reviews selected studies in the area of reading comprehension in order to characterize the differential patterns that skilled and unskilled comprehenders employ. The research reviewed is organized into three broad components: (a) decoding, (b) accessing the meaning of single printed words, and (c) text organization processes or obtaining meaning from larger stretches of text. Results from various studies suggest that good and poor comprehenders differ primarily in the first and third components. Speculations are offered on the interrelationships between these components and their effect on reading comprehension processes.

A COMPARISON OF READING COMPREHENSION PROCESSES IN GOOD AND POOR COMPREHENDERS

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Although considerable research in reading has focused on various aspects of the acquisition of that skill (e.g., Gibson, 1965), only within the last several years have psychologists renewed their study of reading comprehension, one of the more complex aspects of the reading skill. Prior to the 1940s, when researchers such as Buswell (1920), Swanson (1937), and Anderson (1937) considered the purpose of reading to be the extraction of meaning from the printed page, research in reading focused on aspects of comprehension and paid relatively less attention to more molecular problems like word identification. Analyses of eye-movement patterns and oral reading errors produced characterizations of the good and poor comprehender that are not often duplicated in contemporary research. Without the theoretical underpinnings provided by generative transformational grammar (Chomsky, 1957, 1965) and its offshoots (e.g., Chafe, 1970; Fillmore, 1968), early researchers were limited in interpretations of their findings. Renewed interest in reading comprehension is in part a result of the contributions of theoretical linguistics and psycholinguistic research. Various models have been proposed to account for the reading comprehension processes (see, for example, Kavanagh & Mattingly, 1972) and for the processes in language comprehension (see Carroll & Freedle, 1972). However, it is possible that in the final analysis "there is no single model of the reading process," as Gibson and Levin (1975) suggest. Instead, these authors have derived a set of principles that can

encompass the many different types of text and task demands that the reader encounters.

As in some other areas of psychology where one approach has been to attempt to understand the normal by studying the abnormal, researchers in the area of reading comprehension have much to gain by studying breakdowns in components of the reading process. Comparative data on good and poor comprehenders may ultimately serve two purposes. First, such data may guide the researcher to select issues of pragmatic importance in the reading comprehension process. If, for example, good and poor comprehenders diverge mostly at one or two components, researchers may have a clue that those components are more crucial than others in the reading comprehension process. Second, psychologists interested in instructional applications of existing research may be misled by looking at only the skilled comprehender. Glaser (1973) has written that the behaviors that characterize the skilled performer may not necessarily provide a good model for instructional intervention. By studying breakdowns in reading comprehension, the researcher may gain further insight into the skill acquisition process.

Unfortunately, the literature in reading and reading difficulty contains few broad characterizations of the problems of poor comprehenders or of what constitutes mature reading comprehension. The present paper attempts to critically review selected studies that have contrasted reading comprehension in good and poor comprehenders. Hopefully, this contrastive analysis will aid in the elaboration and refinement of existing models of the reading comprehension process.

The perspective in this paper is to view reading comprehension as the extraction of meaning from printed text. In order to extract that meaning, the reader must first be able to decode or recognize individual words. Second, she must access the meanings of those words in long-term semantic memory and be sensitive to the way in which those meanings are

modified by context. Third, the reader must extract the relations specified by the syntactic patterns between words and relate the resulting information to her preexisting knowledge system. And in text, where information spans sentential boundaries, the reader must be capable of comprehending the relations in discourse units (e.g., paragraphs or chapters). While a listing of these components need not suggest that they form an invariant sequence, each component nonetheless plays a role in the acquisition of reading skill and reading comprehension. Thus, there are many potential sources for breakdown in the reading comprehension process. The literature on reading comprehension will be presented in three sections according to the first three components just described: decoding, single word meaning, and text organization. Following the review of the literature, some general conclusions will be offered.

The Identification of Good and Poor Comprehenders

Traditionally, the way to identify good and poor comprehenders is to administer a standardized reading test. Reading tests can be divided into four major types (Maurogenes, Winkley, Hanson, & Vacca, 1974): The first, the "Survey Test," is a group test that always includes a comprehension subtest and is often used by classroom teachers to get a picture of the range of abilities in their classes. Most tests used in the research reported here are of this type. The second type, the "Analytical Test," is also group administered and contains some diagnostic subtests in addition to survey components. The third type, the "Diagnostic Test," is administered individually and is designed to analyze disabilities. The "Special Test," the last type, is usually a group test covering only one aspect of reading and is used in idiosyncratic ways by the classroom teacher.

Depending on the age of the population, there is a variety of standardized tests to choose from. Typically, these tests tap comprehension by

having the individual answer multiple-choice questions following a selection (e.g., the Iowa Silent Reading Test, the Metropolitan Achievement Test) or by having subjects read passages and then "fill-in-the-blanks" by choosing from among a set of alternatives (e.g., Gates-MacGinitie). In the research to be reported, subjects were most often given not just a reading comprehension subtest, but the entire battery of subtests (e.g., vocabulary, reading rate) that a particular reading achievement test contained. This is important since apparently the best way to divide children on reading ability is not by using subtest scores, but through the use of overall scores. According to Farr and Anastasiow (1969), sufficient validity has not been obtained, by and large, for the subtests of the popular reading achievement tests designed for the elementary level. However, when these tests as a whole are taken "as a global measure of reading behavior, they are excellent in that they give a reliable and valid estimate of the achievement range of children in a class in comparison to a larger group" (Farr & Anastasiow, 1969, p. 47). Split-half reliability on the reading comprehension subtests of five popular instruments (California Reading, Gates-MacGinitie, Iowa Silent Reading, Metropolitan Achievement, Stanford Achievement) ranges from .77 to .96 (Farr & Anastasiow, 1969). As of 1969, reliability coefficients had not been computed at all for some of these subtests. Thus, the most basic type of test validity--reliability--has not been adequately established for these subtests.

Furthermore, given the varied definitions of comprehension that exist, it has been claimed that some comprehension subtests assess specific skills such as following directions, noting specific facts, and making inferences (e.g., California Reading Test), and others assess main ideas, details, and specific word meanings (e.g., Metropolitan Achievement). But, it is sometimes the case that experienced teachers cannot identify which items are designed to tap what skills (Farr & Anastasiow, 1969). Failure to obtain this elementary sort of validity seems an important

lacuna. None of the comprehension subtests of the five popular tests mentioned above has complete and satisfactory validity (Farr & Anastasiow, 1969).

One serious problem with regard to validation has been studied by Tuinman (1973). He investigated the extent to which correct scores on these tests can be obtained without reading the passages. He gave 600 students the questions without the accompanying passages and 1200 students questions and passages. None of the tests he used (Nelson Reading Test, California Achievement Test, SRA or Science Research Associates Achievement Series, Metropolitan Achievement [Elementary and Intermediate], Iowa Test of Basic Skills) "provided sufficient guarantees against answering items on the basis of information other than that presented in the passage" (p. 206). The chance score on these tests was calculated at .25, whereas the average probabilities of correct responses without the passage ranged from .32 to .50. Findings of this nature cast considerable doubt on the validity of reading comprehension tests and suggest that prior knowledge of the topics used may be a serious confound. Other factors that affect both scores on these tests and their comparability are: (a) whether the tests are timed, (b) whether the selection remains available when the subject is answering the question, (c) the length of the selection, and (d) prior knowledge of the language structures used (Farr, 1969).

There is a question as to whether reading comprehension tests are measuring something different from verbal IQ. Generally, intelligence test scores correlate with reading test scores (Farr, 1969), with a higher correlation between verbal IQ and reading scores than between nonverbal IQ and reading scores (Hage & Stroud, 1959). Furthermore, as chronological age increases, correlations with reading scores increase, probably because the IQ tests rely more on reading and verbal skills. But there does not seem to be sufficient evidence to conclude that reading tests and intelligence tests are measuring the same skills. While IQ tests are

helpful in predicting reading achievement, other factors such as aspects of language development and beginning reading knowledge are more closely related to success in learning to read (Morrison, 1962; Rosner, 1971). However, even when correlations as high as .80 result, it should be noted that approximately 36% of the variance remains unaccounted for. What probably does account for high correlations is the fact that many reading tests involve specific knowledge that one could have gained prior to the comprehension test (Tuinman, 1973) and that the tests often involve the ability to make inferences and deductions (Carroll, 1972). In sum, it seems that the skills implicated in measuring IQ and in general reading achievement do not completely overlap. Although IQ scores can continue to be used in a gross way to predict reading achievement, other factors specifically involved in reading seem more closely related.

Given the problems associated with the assessment of reading comprehension, researchers may not be splitting their groups on identical criteria. This is partly due to the fact that different reading tests stress different aspects of the comprehension skill. Thus, it should be kept in mind when reading this review that there may not be one constellation of skills that characterizes each of the groups under study. In fact, the empirical literature is inconsistent about who is called a poor "reader" and who is called a poor "comprehender." If the definition of reading used stresses the extraction of meaning from the printed page, then being a good reader is identical with being a good comprehender. However, if reading is conceptualized as a word identification task, then being a good reader (decoder) is not necessarily identical with being a good comprehender. Unfortunately, as Steiner, Wiener, and Cromer (1971) have noted, "much of the reading literature fails to define adequately which (or both) of these activities is meant by reading" (p. 506). Since this author considers the purpose of reading to be comprehension (which may even occur in the absence of the identification of each word), the terms good and poor

comprehender will be used to stress the attainment of this ultimate goal of the reading process. Further, since the standardized tests typically used to assess comprehension do so in different ways, the instrument used to select subjects in these studies is presented in Table 1. Although there is some danger in generalizing across studies which may be dealing with slightly different populations, patterns emerging from the data may prove useful for future research.

Decoding and Reading Comprehension

In this review, decoding will be used to mean the ability to pronounce the printed word. Although they are perhaps not sufficient, adequate decoding skills seem to be necessary for reading comprehension to occur. Researchers have often noted the relationship between poor reading comprehension and poor decoding skills (e.g., Buswell, 1920; Fairbanks, 1937). However, the way in which decoding skills affect text comprehension is still unclear. The results of a study by Clay and Imlach (1971) suggest that poor decoding skills hamper the process whereby the reader chunks text into units larger than the single word. Children who had been reading for 2 1/2 years were distributed into four groups from low to high based on the quantity (speed) and accuracy (decoding errors) of their oral reading, and not on comprehension scores. Not surprisingly, the best decoders (the highest group) seemed to read in "syntactic chunks" with 4.7 words per stress.

Perfetti and Hogaboam (1975) examined the decoding capabilities of a group of good and poor comprehenders in a way that separated the decoding process from text comprehension and vocabulary skills. Their subjects' task was to press a button which stopped a timer when they were ready to correctly pronounce a tachistoscopically presented work. Latencies to the button press and errors were recorded. Results indicated that when the frequency of a stimulus word was high, the good and poor comprehenders in the third and fifth grade had similar recognition latencies and

Table 1

Summary of Criteria for Subject Selection in the Studies Reviewed

Investigator	Subjects' Grade Level in School	Selection Instrument	Criteria
Clay & Imlach (1971)	2	None	Four groups from low to high based on accuracy plus speed score in oral reading.
Perfetti & Hogaboam (1975)	3 and 5	Reading subtest of Metropolitan Achievement Test	Percentile ranks. Good: 76–91; 5th–60–95. Poor: 3rd–4–26; 5th–15–30
Golinkoff & Rosinski (in press)	3 and 5	Reading subtest of Metropolitan Achievement Test	Average grade equivalent score. Good: 3rd–4.25; 5th–7.09. Poor: 3rd–2.23; 5th–3.59.
Cromer (1970)	Junior College	Educational Testing Service Cooperative English Test of Reading Comprehension	Deficit group: Vocabulary and reading below grade level. Difference group: Average vocabulary, low reading.
Fairbanks (1937)	College freshmen	Iowa Silent Reading Test	Good: Above 90th percentile. Poor: Below 10th percentile.
Swanson (1937)	College freshmen	Iowa Silent Reading Test	Good: Above 90th percentile. Poor: 30th percentile and below.
Weber (1970)	1	Word Knowledge, Word Discrimination, and Reading Subtests of Metropolitan Achievement Test	Good: Above 90th percentile. Poor: At or below grade level.
Steiner, Weiner, & Cromer (1971)	5	Unnamed standardized test	Good: At or above grade level. Poor: At least 1½ years below grade level.
Buswell (1920)	2nd grade–4 years of college	William S. Gray's Oral Reading Paragraphs used up to 6th grade	7th grade and on–teacher selection.
Anderson & Swanson (1937)	College freshmen	Iowa Silent Reading Test	Good: Above 90th percentile. Poor: Below 10th percentile.
Denner (1970)	Head Start, 1, 3, 5	None	Teacher selection–"average" and "reading problems."

continued

Table 1

Investigator	Subjects' Grade Level in School	Selection Instrument	Criteria
Willows (1974)	6	Gates–MacGinitie Reading Achievement and predicted reading achievement based on IQ	Good: Reading score was 4 or more points greater than predicted level. Poor: Reading score 4 or more points below predicted level.
Oakan, Weiner, & Cromer (1971)	5	Unnamed standardized test	Good: At or above grade level. Poor: At least 1½ years below grade level.
Matz & Rohwer (Note 2)	4	None	Low vs. high SES blacks.
Anderson (1937)	College freshmen	Iowa Silent Reading Test	Good: Average scores. Poor: Below 25th percentile.
Cromer & Weiner (1966)	5	Durrell-Sullivan Test	Good: Grade level. Poor: 2 years below grade level.
Kennedy & Weener (1973)	3	Metropolitan Achievement Test	All below grade level.
Levin (1971, 1973)	4	Iowa Test of Basic Skills	Good: At or above grade level in vocabulary and comprehension. Poor: Deficit--2 years below grade level in vocabulary; 2 years below in comprehension. Difference--at grade level in vocabulary; 1 year in comprehension.

errors. On less frequent words, the good comprehenders were significantly faster than the poor comprehenders. Subjects' vocalization latencies were also compared on words whose meaning they knew and words whose meanings they did not know. The difference between the known and unknown words for the good comprehenders was not significant. Poor comprehenders, however, had significantly longer vocalization latencies on unknown than on known words. This difference on familiar and unfamiliar words parallels the results obtained with nonsense words: Poor comprehenders took significantly more time to decode these than did good comprehenders. Decoding nonsense and unfamiliar words (which may as well be nonsense) without textual cues apparently forces the reader to apply her most refined word attack strategies. When these strategies are called into play, poor comprehenders may demonstrate their inferior decoding skills.

Golinkoff and Rosinski (in press) also found that poor comprehenders possessed insufficient decoding skills. Third- and fifth-grade subjects read through two word lists. One contained nonsense words (20 trigrams with consonant-vowel-consonant [CVC] structure) and one contained common first-grade level words. When the time required by the good and poor comprehenders to read each of these lists was compared, it was found that good and poor comprehenders did not differ on the time to decode common first-grade level words. However, the poor comprehenders took almost twice as long as the good comprehenders to decode the CVC trigrams.

Cromer's (1970) results suggest that adult good and poor comprehenders may also differ on decoding skill. Cromer subdivided the poor reading comprehenders into two groups, calling one the "deficit" group and the other the "difference" group. According to Cromer, members of the deficit group lack vocabulary skills and possibly decoding skills, although they attempt to organize text into meaningful units. The difference group, on the other hand, appears to possess adequate vocabulary (in comparison with

age peers) and decoding skills, but fails to read text in units larger than the single word. During the course of an experiment designed to evaluate these groups' text organizational patterns, Cromer recorded time to decode and decoding errors under different text presentation conditions. In the condition where the words appeared one at a time (although still in text), the three types of readers did not differ in the number of decoding errors they made. However, the deficit group took significantly more time to decode than the difference group, which took significantly more time than the good reader matched controls. Thus, when a sensitive time measure, rather than the accuracy measure is used, even the difference group may have decoding difficulties. These studies, in combination with some others (e.g., Buswell, 1920; Fairbanks, 1937; Katz & Wicklund, 1971), suggest that poor comprehenders have difficulty decoding unfamiliar words and decode familiar words more slowly than good comprehenders. During actual text reading, when other cues are available, it might be assumed that the number of decoding errors poor comprehenders make would decrease. The next group of studies reviewed suggests that this may not be a valid assumption.

The Nature of Good and Poor Comprehenders' Decoding Errors

The evidence reviewed thus far suggests that poor comprehenders may make more decoding errors and take more time to decode than good comprehenders. Are there differences in the type of decoding errors these groups make during text reading?

Fairbanks (1937) studied the eye movements and errors of good and poor comprehenders in oral and silent reading situations. His college freshman subjects expected that they would be tested for comprehension of the text passages. Results indicated that the poor comprehenders made more decoding errors than good comprehenders (4.7 per sentence vs. 1.72) and made errors of a different nature. According to Fairbanks, "while 51%

of the poor readers' substitution errors seriously perverted the meaning of the passage, no substitution made by the superior group was of that type" (pp. 93-94). Good comprehenders corrected their errors 19% of the time as opposed to 7% of the time for poor comprehenders. Thus, good comprehenders made fewer meaning distortion errors and corrected more of these errors than the poor comprehenders. Swanson (1937) also reported that poor comprehenders made many more decoding errors and more meaning distortion errors than good comprehenders.

Apparently these error types are characteristic of good and poor comprehenders at the earliest stages of learning to read. Weber (1970) examined first graders' oral reading errors in terms of their appropriateness to preceding grammatical context. She found that poor comprehenders made more decoding errors than good comprehenders. Furthermore, the good comprehenders passed over or let stand uncorrected 73% of the errors that conformed to the meaning of the sentence and corrected 85% of the meaning distortion errors. The poor comprehenders responded similarly with acceptable errors, letting 68% go uncorrected, but they corrected only 42% of the meaning distortion errors. Good comprehenders corrected twice as many errors as the poor comprehenders that distorted sentence meaning. The type of decoding errors reported in these studies suggests several hypotheses about poor comprehenders' reading problems that may not be mutually exclusive: First, it may be that poor comprehenders have unconventional standards of what is acceptable in oral reading, or second, they may lack efficient strategies for finding the errors that upset meaning. Third, poor comprehenders may less frequently detect when the meaning of a sentence has become anomalous because they are not comprehending to begin with.

A study by Steiner, Weiner, and Cromer (1971) was designed to reduce the large number of decoding errors made by fifth-grade poor comprehenders. Good and poor comprehenders' decoding errors were

compared on novel stories about which they had been given advance information in the form of a summary. Good comprehenders made a mean of 2.15 decoding errors without advance information and an increased number (3.04) with advance information. They also were more likely to correct their initial decoding errors when they had advance information. On the other hand, poor comprehenders made a similar mean number of errors with (10.02) and without (10.63) advance information and were not more likely to correct these errors when they knew what the story was about.

The three studies mentioned above (Fairbanks, 1937; Steiner et al., 1971; Weber, 1970) assessed decoding errors during oral reading. Would the same sorts of errors occur during silent reading? Buswell (1920) found that the eye "tripped over" the same difficult words in oral and silent reading. Anderson and Swanson (1937) studied the correspondence between eye movements during oral and silent reading and found much similarity. However, poor comprehenders' eye movements showed greater correspondence in oral and silent reading than did good comprehenders' eye movements. Poor comprehenders seemed to continue laborious word-by-word reading, even when reading silently. Good comprehenders skipped words and read more quickly during silent reading. Thus, it is likely that poor comprehenders would make similar errors in oral and silent reading. Good comprehenders' errors, however, may vary more depending on the task.

In sum, the evidence suggests that poor comprehenders may possess inadequate decoding skills. Decoding tests using single words in isolation or textual selections find that poor comprehenders make more decoding errors than good comprehenders. And, perhaps more interestingly, the character of poor comprehenders' decoding errors may differ from the type that good comprehenders make. Poor comprehenders are more likely than good comprehenders to produce errors that do not conform to the meaning of the selection and to fail to correct their inappropriate errors.

Finally, poor comprehenders' decoding errors are not likely to decrease when they are given advance information about the passage.

It is possible that there are some poor comprehenders who possess adequate decoding skills, although this group may be rare. Goodman (1973) has argued that "remedial reading classes are filled with youngsters . . . who can sound out words but get little meaning from their reading" (p. 491). These readers may lack the self-generated skills needed to perceive text in meaningful units. Although paragraph indentation and punctuation are undoubtedly helpful in segmenting text (Clay & Imlach, 1971), they must be supplemented by the reader's own activity on the incoming test. In the next section, one way in which poor decoding may hinder text comprehension will be examined.

Single Word Meaning and Reading Comprehension

It was stated earlier that text comprehension relies upon the decoding or recognition of individual words, the access of the meaning of those words in long-term semantic memory, and the extraction of the relations between words. It is important to determine whether problems in decoding can affect the access of single word meaning.

Problems in decoding may affect the reading comprehension process in one of two ways: They may disrupt the reader's search for the meaning of individual words, or they may hamper the extraction of the relations specified between words by a more indirect process, for example, by overloading short-term memory. Unfortunately, few studies have sought to disentangle problems in the organization of text from problems in the access of individual word meanings. It is possible that text organization problems are the result of the reader failing to obtain the meaning of the individual words as she reads. Studies in this section have examined good and poor comprehenders' understanding of individual printed word meanings.

Results from a study employing logographs--abstract geometrical symbols that stand for words--may indicate that poor comprehenders do not have difficulty with the notion that a symbol can stand for a word meaning. When taught that a logograph stood for a meaning, children who had difficulty learning to read and Head Start children considered to be likely to experience reading failure could easily act out the meaning of individual logographs (Denner, 1970). However, when asked to act out the meaning of a sequence of logographs (such as a symbol for jump, another for over, and one for book), the children having reading difficulty continued to treat each symbol as a separate entity unmodified by the symbols around it. Even though this study suggests that single word meaning may not be a problem in principle for the poor comprehender, "reading" logographs is not the same as reading words.

Golinkoff and Rosinski (in press) tested whether poor comprehenders could access the meaning of single printed words. They presented third- and fifth-grade good and poor comprehenders with a series of picture-word interference tasks and with a timed set of decoding tests. The interference tasks required that subjects label 20 pictures aloud as fast as they could and ignore the words (or trigrams) that had been superimposed on the pictures. Poor comprehenders took significantly more time than good comprehenders to complete all the interference tasks. However, the relative differences between interference tasks were identical for both groups. All children took significantly more time, and thus experienced significantly more semantic interference from the meaning of real words than from the nonsense trigrams. Thus, although the good and poor comprehenders differed in decoding ability, they were not distinguishable on the amount of semantic interference they experienced from the meanings of single printed words. This finding may imply that decoding and semantic access skills are independent processes to some extent. Being a poor decoder may not interfere with obtaining a word's meaning. The pick-up of single word

meaning may be an almost automatic process as soon as minimal decoding skills are attained (Rosinski, Golinkoff, & Kukish, 1975).

It is possible, however, that poor comprehenders have other problems at the single word level. Perhaps inadequate decoding skills cause poor comprehenders to fail to note the subtle shades of single word meaning as they are signaled by text. Buswell's (1920) experiment with text-embedded ambiguities may be interpreted to provide support for this possibility. Poor comprehenders were far more likely to mispronounce ambiguous words (such as clothing "tears" or crying "tears") as they encountered them in text reading. It is possible that longer decoding times do not permit the reader to anticipate which meaning and pronunciation the text implies.

In sum, the poor comprehender may readily obtain the meaning of common printed words. Golinkoff and Rosinski's experiment needs to be done with less familiar words (although still in the child's aural vocabulary) to determine if decoding deficiencies hamper the extraction of individual word meaning on harder words. Longer decoding times may also hamper the poor comprehender from selecting the right meaning for a word when that word is presented in text.

Text Organization and Reading Comprehension

In order to study the acquisition of the reading skill, Buswell (1920) produced a classic monograph on text organization and comprehension. He traced the development of the "eye-voice span" (EVS) and the way in which the EVS in oral reading was related to the recognition of meaning in silent reading. The EVS is the number of words or letter spaces that visual processing is ahead of aural reading. EVS has been assessed with eye movement photography coordinated with voice keys or by simply asking the subject to tell what she saw after a text she was reading was made unavailable, for example, by turning out the light or placing a card on the

text (Levin & Turner, 1968). Buswell selected good and poor oral readers at each grade from the second through the fourth year of college. Subjects' eye movements were photographed as they read both aloud and silently. At various points in the sentence (within meaningful paragraphs), the position of the eye in relation to what the voice was saying was assessed. Subjects were urged to read naturally and to try to remember the thoughts well enough to be able to explain what they had read. While Buswell did not actually assess comprehension, the focus of his research and the model of reading he developed was concerned with the extraction of meaning from printed text. He noted time and again that poor oral readers seemed to have difficulty with comprehension as evidenced by their inability to use sentential cues to select the correct pronunciation of an ambiguous word.

Several findings distinguished good from poor comprehenders. First, the length of the EVS correlated with reading ability, with the better comprehenders having the wider EVS because they made fewer and briefer fixation pauses. Across grades, the EVS for good comprehenders was 13.8 letter spaces (about 2 words), but the EVS for poor comprehenders was 8.7 letter spaces (a little more than one word). Fewer and briefer fixation pauses meant that the good comprehenders were not actually reading each and every word but using context to speed up word recognition. The subjects with wider EVSs more often gave expressive oral presentations, Buswell noted, since they had an opportunity to anticipate and interpret the meaning of the sentence in larger units. Second, the width of the EVS at the end of the sentence distinguished between the groups. For good comprehenders, the EVS shrank at the end of the sentence indicating that they had perceived it to be the end of a unit of meaning. Poor comprehenders' EVS was no shorter at the end of a sentence. The fact that Buswell found EVS variation at different points in the sentence for good comprehenders, rather than at different points in the line, caused him to observe that the EVS was controlled by "thought units" and was not merely "a matter

of the mechanics of book construction" (p. 50). Thus, good comprehenders exhibit evidence that they treat sentences as units of meaning, whereas for poor comprehenders,

> The whole process is a more or less monotonous repetition of words as they are encountered. The eye moves along at a regular rate and the voice follows. The end of a sentence creates no special disturbance for it is passed over with little attention. (p. 5)

Third, Buswell noted that the nature of good and poor comprehenders' regressive eye movements differed, if the fixation right before the regressive movement was considered. Good comprehenders' regressive eye movements occurred mostly after the eye had made a long jump ahead, but poor comprehenders' regressions occurred more frequently within the same word. This suggested that poor comprehenders were unable to use inter-word redundancy to help them read single words; they found it necessary to see word details before they could recognize them. Good comprehenders, on the other hand, had developed a scan-for-meaning strategy and backtracked only after they had been unsuccessful in grasping the meaning of a larger segment of text. Buswell considered the latter pattern to be more efficient and advanced than the word-by-word reading of poor comprehenders.

Apparently, the good comprehender reads in large units, utilizing information between (and within) words to enable her to minimize frequent fixation pauses and word-by-word decoding. Good and poor comprehenders appeared concerned with different aspects of the reading process: The good comprehenders attempted to gain meaning from what they read; the poor comprehenders seemed more concerned with word identification. The contemporary studies cited below will provide support for the characterization of good and poor comprehenders that Buswell developed in 1920.

The Units of Reading

What are these "larger units" that good comprehenders read in? Researchers using single sentences or sentences in "paragraphs" of unrelated sentences have claimed that the phrase is the unit of reading (Levin & Kaplan, 1970; Levin & Turner, 1968; Schlesinger, 1968). Apparently, surface structure phrase boundaries serve to organize text in the same way that they affect aural sentence perception (Fodor & Bever, 1965; Suci, 1969). Separating sentences into phrases would be a way for the reader or sentence processor to organize text into grammatical and semantic units. Cues for phrase structure are sometimes given by punctuation in reading and, perhaps, by prosodic cues in speech. The information the reader (or listener) uses to perform this parsing is still unclear.

However, it may be too strong a statement to argue that the phrase is the unit of reading (Kolers, 1971). While the phrase may be favored, it is more likely that "phrases, clauses, or whole sentences are the units and the recognition of the complete meaning must be in a liquid state during the reading process, being subject to continual change and being held in the mind in a tentative fashion until the end of the unit of thought is reached" (Buswell, 1920, p. 101). The highly skilled comprehender, in other words, will use the largest unit she can to accomplish her purpose and gain meaning from text (Gibson & Levin, 1975; Kolers, 1971).

Results of a study on sixth-grade good and poor comprehenders also suggest that the phrase may be too small a unit to reflect the way a skilled comprehender operates on text. Willows (1974) used Neisser's (Note 1) selective reading technique to examine the deployment of attention during oral reading. In the selective condition, subjects were presented with a double-spaced story typed in black ink. Between the lines of that story were sequences of words that related to the main story typed in red ink. Subjects were instructed to read the relevant story aloud and to ignore the interlinear material. Willows reasoned that placing similar content to the

relevant story between the lines would affect reading performance of the relevant lines. She expected that poor comprehenders would be more susceptible than good comprehenders to the influence of the interlinear material, since her thesis was that the inadequate development of selective attention was a major cause of reading problems. In the control condition, subjects received the passages double-spaced (no interlinear material) and typed in black ink. The dependent variables were decoding errors, reading time, and scores on a multiple-choice test of reading comprehension. The distractors in this test contained one wrong answer from the interlinear material.

Results indicated, as might be predicted, that the poor comprehenders made more decoding errors on the control and relective stories and took longer to read both stories and to answer the comprehension questions. The poor comprehenders also made more nonintrusion comprehension errors (i.e., distractors within the story). However, counter to prediction, the poor comprehenders made significantly fewer intrusion comprehension errors (i.e., material from between the lines) than the good comprehenders.

The good comprehenders seemed to be more vulnerable to the meanings of the interlinear material; the poor comprehenders were more affected by the physical presence of the lines and little affected by the relevant interlinear meanings. The fact that the competing meanings affected the good comprehenders suggests that they had developed a scan-for-meaning pattern, perhaps having automatized their basic decoding skills to be handled "preattentively" (LaBerge & Samuels, 1974; Neisser, Note 1). Thus, although some research suggests that good comprehenders concentrate on phrase units as they read, Willows' results portray the good comprehender as engaged in a more active sampling procedure, even to the extent of being unable to ignore relevant interlinear material outside phrase or sentence boundaries. Any characterization of the good comprehender that stresses

an orderly progression through phrase units would probably be missing the mark since sampling from other areas in text occurs at the same time.

Testing a Model of Poor Comprehension

A program of research inititated by Weiner and Cromer assumes, as did some of the classic research (e.g., Buswell, 1920), that some poor comprehenders are reading in a word-by-word fashion (Cromer, 1970; Oakan, Weiner, & Cromer, 1971; Steiner et al., 1971). These authors (Cromer, 1970; Weiner & Cromer, 1967) suggest that the empirical literature in the area of reading difficulty has accounted for such difficulty with one of four models:

1. The defect model--Some nonfunction or disfunction (e.g., sensory impairment) caused reading problems.
2. The deficit model--An absence of some function or ability which must be present before good reading can occur (e.g., vocabulary skills).
3. The disruption model--Some interference (e.g., anxiety or hyperemotionalism) prevents adequate reading.
4. The difference model--A mismatch between the individual's mode of responding and the pattern of responding assumed necessary for adequate reading. These readers read text word by word rather than in word groups (Cromer, 1970).

Thus, these researchers have raised the key issue of whether poor comprehenders may possess sufficient decoding skills and still not comprehend text (Cromer, 1970). In addition, they have tested the notion that poor comprehenders may have some general deficit in language comprehension skills (Oakan et al., 1971).

In a study designed to test the difference and deficit models, Cromer (1970) found that good comprehenders read in at least phra size units and poor comprehenders tend to read word by word. Th .ifference model implies that some compr henders who can decode well habitually organize text in some nonoptimal word-by-word manner. Thus, the difference groups' comprehension scores should increase when text is organized for them. The deficit group, possessing inadequate vocabulary skills, should not be helped by experim nter-produced text organization.

Cromer separated junior college students into four matched groups: two groups of poor comprehenders (difference and deficit) and one group of good comprehenders matched to each of these. The difference group had adequate vocabulary scores (see Table 1) but low reading comprehension scores. The deficit group had low scores on the vocabulary test and low reading comprehension scores. There were four conditions or modes in which the selections were presented. All subjects read a selection in a regular sentence mode, a meaningful phrase mode (e.g., the cow jumped/ over the moon), a fragmented phrase mode (e.g., the cow/jumped over the/ moon), and a single word mode in which the subject controlled the appearance of the words. The dependent variable of interest here was subjects' scores on comprehension questions that followed each selection.

Results indicated that across modes the poor comprehenders answered fewer questions correctly than the good comprehenders. However, the difference group of poor comprehenders performed as well on the comprehension questions as did their control group under the meaningful phrase mode. Furthermore, unlike their control group who was disrupted in the single word and fragmented conditions, the difference group's comprehension scores did not differ in the regular sentence, single word, and fragmented phrase mode. These results suggest that the difference group ordinarily reads word by word (hence, no effect in the disruptive conditions) and that

imposing phrase-like organization on text for them facilitates their comprehension.

The deficit group, however, was not facilitated in the meaningful phrase mode. Cromer argues that their problem is more than just text organization. Surprisingly, the deficit group did best in the single word mode. It may be that this mode forces them to read every word--including the "hard" ones--which they might ordinarily skip because of inadequate vocabulary (and/or decoding) skills. Thus, according to Cromer's model, it may indeed be possible to distinguish between two types of poor comprehenders (difference and deficit), although the etiology of these respective disturbances remains unclear (e.g., see the discussion of the difference and deficit groups in the above section on decoding).

The fact that neither of the control groups increased their comprehension in the meaningful phrase mode suggests that they ordinarily organize text into phrase-like units. Furthermore, the controls for the deficit group, who had high comprehension plus high vocabulary scores on standardized tests, did better in all modes than the controls for the difference group, who had high comprehension and average vocabulary scores. The controls for the deficit group were not even appreciably disrupted by having selections presented in the single word and fragmented phrase conditions.

Apparently, the good comprehender organizes text into units at least as large as the phrase. Whether the extraction of meaning from larger segments of text frees the individual to pay relatively less attention to word detail or whether rapid decoding frees the individual to extract meaning from larger segments of text is unclear.

Steiner et al. (1971) argued that poor comprehenders may not have a decoding problem per se, but rather a problem in the use of contextual cues which can free a reader from word-by-word reading. To test this hypothesis, fifth-grade poor comprehenders were given "supplementary contextual information" in the form of an advance aural summary to

facilitate their use of interword relationships. The control group of good comprehenders was not expected to reduce their identification error rates. Each subject read a story aloud under four conditions: single word and paragraph modes with no supplementary information and single word and paragraph modes with supplementary information.

The opposite of the predicted results were obtained. Good comprehenders made significantly more errors with supplementary contextual information than without. Poor comprehenders' high error rate remained unchanged with supplementary information. Apparently, good comprehenders used the supplementary information to pay less attention to word detail, and poor comprehenders continued to experience decoding difficulty.

The single word mode reveals how good comprehenders impose structure and organization on incoming test. Steiner et al. (1971) noted that these subjects made anticipation errors as they cranked the drum. In fact, many of these subjects identified whole phrases before they could view all the words! In contrast, poor comprehenders seemed to be "identifying words as if the words were unrelated items unaffected by syntactical or contextual relations" (Steiner et al., 1971, p. 511). This reading style is similar to the list-like style Clay and Imlach (1971) described above for poor comprehenders. Unfortunately, Steiner et al. did not assess comprehension of the passages, so it is not possible to determine what effect decoding errors and advance summaries had on reading comprehension.

In sum, the preceding studies characterize the poor comprehender as concerned with decoding each word and failing to utilize the interword relationships that could speed up the decoding process and permit more efficient text sampling. The good comprehender, however, appears to scan for meaning, organizing text into at least phrase-size units and sampling from other areas at the same time. However, these characterizations are to some extent a caricature, emphasizing what may be predominant patterns. If poor comprehenders were not gaining some

meaning from text, the following results would be unexplainable: (a) 90% of the uncorrected reading errors made by both skill groups conformed to the meaning of text (Weber, 1970); and (b) poor comprehenders made more decoding errors on emotional than on neutral passages (Cromer & Weiner, 1966). In general, however, the literature seems to support these characterizations.

Comparing Aural and Reading Comprehension

The second issue the Weiner and Cromer research group raised--that of a general comprehension deficit in poor comprehenders--was addressed by comparing fifth-grade good and poor comprehenders on aural comprehension (Oakan et al., 1971). Subjects were given four types of text presentations, half auditory and half visual, and subsequent comprehension questions. Under auditory presentation, subjects heard two stories, one read by a good and one by a poor oral reader. The visually presented stories were transcriptions of the good and poor readers' oral renditions of the stories. The poor comprehenders received identification training on the words in the stories. Results indicated that the groups did equally well with good auditory input. However, the good comprehenders' scores did not decline with the poor auditory input, whereas the poor comprehenders' scores did. Oakan et al. conclude from these findings that poor comprehenders do not suffer from any general comprehension deficit.

Research by Matz and Rohwer (Note 2) seems to support the notion that poor comprehenders do not suffer from a general comprehension deficit. When pictures accompanied an auditory version of a story, good and poor fourth-grade comprehenders performed similarly on comprehension questions. These same poor comprehenders did significantly worse on the text comprehension when they heard the stories without the pictures.

On the visual stories, Oakan et al. (1971) found that the poor comprehenders did poorly with both types of input. This is similar to Cromer's

(1970) finding that the difference group was not disturbed by a fragmented phrase condition. Interestingly, good comprehenders did better under good visual input than under good auditory input. Perhaps good comprehenders know when to go back over words or meanings they missed at their first run-through, an option not available when the stories are presented aurally. Perhaps an additional difference between these groups is that good comprehenders are sensitive to when comprehension has or has not occurred. If poor comprehenders are less aware of what it means to comprehend text, then perhaps they will be less capable of altering their reading style to suit task demands.

The Flexibility of Reading Comprehension Strategies

A study by Anderson (1937) describes the flexibility which good and poor comprehenders display on different reading tasks. Based on the eye-movement records of university freshmen who were good and poor comprehenders, Anderson reported that:

> The eye movements of both groups (good and poor comprehenders) are influenced similarly as the difficulty of text increases, e.g., the eye movements approach a pattern common in immature stages of reading development. In adjusting to increasingly difficult reading material, good readers modify their eye movements over a more flexible range than do poor readers, and the greatest modification occurs in the measures most highly correlated with reading ability, i.e., mean size of fixation, mean regressions per line, and mean rate of reading. Poor readers do not show this selective mode of variation. (p. 11)

Good and poor comprehenders' eye-movement patterns contrasted again when they read three passages, controlled for difficulty, under different directions. On one passage, subjects were instructed to get the general idea; on a second, to get a moderate knowledge of the text; and on a third, to obtain a detailed understanding. Poor comprehenders, evidently engrossed in elementary reading problems, tended to read all materials in about the same way. When they tried to comply with instructions to "read

for the general idea," their eye movements became increasingly irregular. The good comprehenders, on the other hand, flexibly adapted to the different instructions. When told to read for the general idea, they gave their best performance, with few and short pauses and regular fixations. The differential alteration in eye-movement patterns by good and poor comprehenders following varying reading instructions emphasizes the dependence of eye-movement behavior upon reading comprehension processes (Anderson, 1937; Levin & Cohn, 1968).

It used to be thought (e.g., Dearborn, 1906) that eye movements governed reading comprehension. This peripheral definition of reading comprehension often led researchers into eye-movement training to improve comprehension. This approach only succeeded when the text was preorganized for the reader into phrases (Robinson, 1933--a foreshadowing of Cromer, 1970). Other remediation techniques that stress text organization skills also seem to have some success in improving reading comprehension.

Facilitating Text Organization

The notion that the poor comprehender fails to utilize interword redundancies and reads word by word is supported by studies in which poor comprehenders make errors in supplying missing words on cloze tests (Cromer & Weiner, 1966). For example, there would be a variety of "correct" answers for the blank in "my parents are not home as they went _____ after dinner" that would conform to the meaning and syntax of the context. Fifth-grade poor comprehenders made far fewer correct insertions than good comprehenders. To the extent that the insertions required in a cloze task are not confounded with conceptual knowledge or with poor decoding skills, poor comprehenders may not often be processing the meaning of the sentence.

Kennedy and Weener (1973) trained third-grade poor comprehenders on two types of cloze tasks to improve reading and listening comprehension. Since performance on cloze tasks is correlated with reading comprehension scores, these authors reasoned that training on cloze tasks might affect comprehension. In order for sentences to be properly completed in a cloze task, the subject must work with units larger than the single word and make use of semantic and syntactic information.

Half the subjects received auditory cloze training with a bell rung in the place of the deleted word and half received visual cloze training; each treatment had a control group. After training sessions summing to 1 2/3 hours, all subjects received a variety of posttests: the Durrell reading and listening tests and visual and listening cloze tasks.

Results indicated that children trained on the visual cloze task did significantly better on the Durrell Reading Comprehension posttest than the two control groups and the group trained on the auditory cloze. As predicted, children trained on the listening cloze did best on the Durrell Listening Comprehension Test and improved some, but not significantly, on the reading comprehension posttest. Thus, training on a visual cloze task--even for only 1 2/3 hours--may facilitate poor comprehenders' extraction of meaning from text. Measurable improvement on a standardized test is impressive evidence that something important and transferable was being learned. Perhaps poor comprehenders had begun to use contextual cues to help them decode and were moving away from excessive attention to word detail. (The inclusion of eye-movement photography could validate this assertion.) Apparently, poor comprehenders can be trained to utilize contextual cues to gain meaning from text.

Nonverbal Strategies of Text Organization

Up to now, patterns of textual organization have been reviewed that rely primarily on verbal skills such as the ability to parse the surface

surface of a sentence into phrase-like units. Nonverbal strategies of text organization, such as the use of mental imagery, may also be used differentially by the good and poor comprehender.

Research using paired-associate learning tasks has shown that instructing subjects to produce mental images of the interactions between two nouns to be remembered greatly facilitates recall of those nouns (Bower 1972; Paivio, 1971). The evidence on imagery facilitation of text organization and reading comprehension is just beginning to be amassed. The evidence that does exist suggests that comprehension can be improved by instructing subjects (at least high school and above) to have mental images as they read (Anderson & Hidde, 1971; Anderson & Kulhavy, 1972; Lesgold, Curtis, De Good, Golinkoff, McCormick, & Shimron, 1974). However, it is not clear whether the facilitative effects of imagery instructions are in fact due to visual imagery or to some combination of visual and verbal factors.

Levin (1971) has argued that good comprehenders ordinarily produce mental imagery during text reading. To support this assertion he cited the work of Matz and Rohwer (Note 2), who showed that poor comprehenders do not suffer from a general comprehension deficit since they could comprehend stories as well as good comprehenders when pictures illustrating the story were provided. Thus, reading comprehension problems may be due at least partly to a failure to spontaneously employ mental imagery or other forms of text organization related to imagery. Whereas Matz and Rohwer provided the pictures for their subjects, Levin (1973) attempted to induce poor comprehenders to provide their own "pictures" through the use of mental imagery. His study also tested the difference model of poor comprehension (Cromer, 1970; Weiner & Cromer, 1967). If difference readers lack mostly text organization strategies, while deficit readers lack vocabulary and/or decoding skills as well, then only difference readers should

profit from being instructed to use a text organizational device such as imagery.

A fourth-grade group of good comprehenders and two groups of poor comprehenders (difference and deficit) were given three treatments: (a) stories to read with no special instructions; (b) the same stories with instructions to think of a picture in their mind's eye of the contents of each sentence as they read the passage; and (c) just the pictures that corresponded to each sentence of the passage. All subjects were told that they would have to answer comprehension questions.

The important finding of this study was that the difference group answered an additional 26% of the questions correctly under imagery instructions while the deficit group showed no such gains. Good comprehenders' scores also significantly rose under imagery instructions. The other experimental condition--just seeing pictures of the text--showed no gains for any group, probably because an auditory version of the text was not available at the same time. Thus, Levin's data extended the difference-deficit distinction from experimenter-provided text organization (the meaningful phrase groupings condition of Cromer, 1970) to subject-generated text organization. Levin (1973) wrote, "by inducing the difference poor readers to attend to semantic characteristics and relationships (i.e., by having them visualize the thematic content of the passage), their reading comprehension improved drastically" (p. 23).

While Levin's results indicated that imagery instructions helped the difference group, Lesgold et al. (1974), using a similar population, did not find imagery facilitation with average and above average third- and fourth-grade readers. This may be due to the fact that Lesgold et al. presented subjects with the whole passage and not a sentence at a time the way Levin had. Could children who were poor comprehenders be taught to use visual imagery for a whole passage at a time? Since any sort of self-generated organizational strategy (such as imagery) has more

potential utility than experimenter-produced organizations (such as phrase groupings), it was important to answer this question.

Lesgold, McCormick, and Golinkoff (1975) attempted to train third and fourth graders, who were mostly below grade level in reading, to utilize mental imagery as they read text. The basic medium of instruction was a task in which the children read short passages and then drew comic strip cartoons with stick figures to illustrate the events in the passage. Throughout the training procedure, which lasted about a month, various new criteria were introduced for these cartoons, so that by the end of the training period, children knew that an adequate cartoon was one in which every picturable fact was presented. This procedure was assumed to be training children to hold more complete imaginal representations in mind and to attend to detail. Standardized reading tests and paraphrase recall tests were used for pre- and posttest training assessment in the experimental and control group. The control group read more stories than the experimental group and answered comprehension questions instead of drawing cartoons.

The results indicated that the experimental group had indeed profited from the training. However, this gain was only revealed under a paraphrase recall posttest that instructed subjects to use visual imagery. Without explicit imagery instructions, the experimental group did not recall significantly more than the control group. Apparently, these children had learned to use imaginal mediators to facilitate text comprehension and prose learning. However, what Flavell (1970) and his colleagues have termed the "production deficiency," that is, the inability to apply existing skills, may have been operating since poor comprehenders did not spontaneously call up their newly learned skills.

The poor comprehenders' training had no effect on their scores on the standardized reading test, whether it was administered with or without

imagery instructions. Thus, the organizational strategy subjects learned during training did not readily transfer to a virtually identical situation, that is, reading a passage without imagery instructions.

Evidence reviewed in the latter half of this section on text organization leads to several tentative conclusions. First, and perhaps most important, is the evidence that pertains to the question of whether poor comprehenders possess a general comprehension deficit. Two preliminary studies (Oakan et al., 1971; Matz & Rohwer, Note 2) suggest that the answer to that question is no; inadequate reading comprehension need not imply inadequate aural comprehension. Second, although the unit of reading may be task dependent for the good comprehender, poor comprehenders seem less capable of altering the size of that unit under different task demands (Anderson, 1937). Whether this is due to inadequate decoding skills or to a lack of insight into self-monitored comprehension processes is not clear. Third, reading comprehension can be increased through either the manipulation of aspects of text (Cromer, 1970) or through training the reader in verbal and nonverbal strategies of text organization (Kennedy & Weener, 1973; Lesgold et al., 1974; Levin, 1973). As Levin (1973) has pointed out, in the long run, remediation techniques that stress providing the reader with self-generated strategies will probably prove most valuable. It may be that some combination of verbal and nonverbal training is a best bet.

Concluding Comments

What picture emerges of the difference(s) between good and poor comprehenders? What issues should future research in the area of reading comprehension address?

Summary of the Characteristics of the Good and Poor Comprehender and Implications for Research

The good comprehender. The good comprehender seems to be capable of rapid and accurate word recognition (e.g., Golinkoff & Rosinski, in press).

Given that the good comprehender seems to have automatized basic decoding skills, perhaps in the sense Laberge and Samuels (1974) discuss, what is the unit or units that the good comprehender reads in? The literature reviewed seems to suggest that at minimum the good comprehender reads in phrase-like units (e.g., Cromer, 1970). However, material outside phrase, clause, or sentence boundaries may be incorporated during the reading process (Kolers, 1971; Willows, 1974).

For good comprehenders, the unit selected will probably be a function of task demands (Anderson, 1937; Anderson & Swanson, 1937; Levin & Cohn, 1968). Good comprehenders are adaptable and flexible in their pattern of reading; they will vary their eye movements, shift the size of their processing unit, and efficiently use supplementary contextual information (Steiner et al., 1971). This description of the good comprehender is similar to what Gibson and Levin (1975) have argued is one of the hallmarks of skilled reading: the ability to process textual material in the most economical way possible given the task at hand. According to Gibson and Levin, the skilled comprehender does this in four ways: First, she pays most attention to information or strategies of reading relevant to her purpose. Second, the converse of the first, she ignores information that has no utility for the task. Third, she reads in the largest unit appropriate for the task. Fourth, she will process the least amount of information compatible with the task. For example, given advance organizers (Steiner et al., 1971), good comprehenders ignore word details and produce words that are incorrect although compatible with the set they had been provided by the experimenter.

Given that good comprehenders are adaptable and flexible, it is not clear what to attribute this to. It has been suggested that good comprehenders possess some awareness of what good reading comprehension is and when it has occurred. While little research on this issue has appeared, three suggestive findings are worth noting. First, good comprehenders make fewer uncorrected oral reading errors that disturb the meaning of text (Weber, 1970). Second, good comprehenders performed better under good visual input than under good auditory, indicating that they may know how to get the most from text (Oakan et al., 1971). Third, in an interview study with twelfth-grade good and poor comprehenders, Smith (1967) reported that only the good group claimed to change their reading styles to adjust to the task of reading either for details or for the general impression. These findings are reminiscent of the findings from a line of research initiated by Flavell (1970). An individual's awareness of a cognitive process she possesses, such as memory, enables the individual to modify that process to suit her goals. Although Flavell's research is on children, the ability to reflect on the reading process by children and adults is a provocative analogue.

In sum, the good comprehender seems to use a scan-for-meaning pattern which she can apply flexibly to suit her purpose. The skilled comprehender clearly treats reading as a process through which she can gain information about events and relations in the world.

The poor comprehender. First of all, it is not clear that there is only one type of poor comprehender. Cromer (1970) and Weiner and Cromer (1967) may be proven correct in their distinction between a deficit and a difference type of poor comprehender. The deficit type may be the more typical type in that she lacks vocabulary skills, possibly decoding skills, some text organization skills, and may be identifiable from poor oral reading. The difference type may experience difficulty mostly at the level of text organization processes. Thus, some poor comprehenders may have

inadequate language comprehension skills while others may lack skills--such as text organization processes--that are peculiar to reading.

It may be that both the difference and deficit types have inadequate decoding skills. However, the difference group's decoding problems may be masked when number of errors is the dependent variable (Cromer, 1970). Decoding rate seems capable of distinguishing between good and poor comprehenders of both types. While rapid decoding may be a problem for the poor comprehender, an explanation of the nature of the problem or its effect on comprehension is anything but simple. A recent study (Coomber & Hogie, Note 3) has shown that poor comprehenders may be more sensitive to spelling pattern violations than good comprehenders. Thus, slow decoding rate may not be due to a failure to utilize intraword information in the form of spelling patterns. Additional research is clearly needed to uncover how, if at all, slow decoding rates may hamper text organization skills or the extraction of single word meaning. Furthermore, future research will need to mirror the complexity of the decoding process if it is to isolate sources of difficulty. For example, Perfetti and Hogaboam's (1975) definition of "decoding" involves "code breaking" plus the time it takes to begin saying the word aloud ("vocalization latency"). Thus, decoding may not be a unitary process, and poor comprehenders may falter on only some aspects.

Apparently, poor comprehenders do not experience difficulty in obtaining the meanings of single printed words or logographs (Denner, 1970; Golinkoff & Rosinski, in press). This was an important finding since previous research on poor comprehension had not established that poor comprehenders could extract meaning from single printed words--at least short words of high frequency. This finding must be extended to determine if slower decoding of familiar, but harder to decode words interferes with the access of single word meaning. One possibility is that if extended decoding necessitates attention to a word's phonological

features, interference could occur in searching for the word's meaning in semantic memory.

Another area--aside from decoding--for which there is evidence that good and poor comprehenders differ is on text organization. Text organization was used in this paper to refer to the reader's ability to read text in units larger than the single word. Text organization processes may involve verbal and nonverbal processes and may result in larger or smaller units depending on the task.

Poor comprehenders seem to possess less ability than good comprehenders to organize text, regardless of whether the strategy examined is verbal (Clay & Imlach, 1971) or nonverbal, as in imagery organizers (Levin, 1973). There may be more than one cause of this problem, such as poor decoding and/or lack of insight into the reading process, but the present state of research does not permit us to distinguish among alternatives. McConkie and Rayner (Note 4) have developed an eye-movement controlled display system that may lend itself to charting text organization processes. For example, it would be important to know on what areas in text the good and poor comprehender fixate. Some of Buswell's (1920) data suggest that, at least for the good comprehenders, verbs may be potent attention getters during reading. This is provocative in light of recent assertions that the verb may be the "center" of meaning in the sentence (Chafe, 1970). Detailed observations and analysis of on-line reading behavior during the reading of normal or disrupted text may prove informative for defining text organization processes.

In sum, the poor comprehender seems to read text in a word-by-word manner, with a minimum of text organization. She is also generally inflexible to variations in task demands (Anderson, 1937) and seems to use a minimum-sized unit. This will make the poor comprehender (at least the deficit type) sound as though she were reading a grocery list during oral reading (Clay & Imlach, 1971).

Closing Observations

During the comprehension of text, several distinct components have been identified--even if they do not occur sequentially--and were offered as a framework to organize the data in this review. Decoding (or word recognition processes), the access of single word meaning, and the extraction of relations between words in sentences and in longer stretches of text were suggested. The way in which these individual components come together during reading comprehension, how one influences the others, and how deficiencies in one affects the others are still not known. In addition, the complexity of each of these three components has been by and large bypassed in this paper, and each component could be further redefined. While there are still many unresolved issues, ongoing research and theoretical developments in the area of the nature of text (and discourse) (e.g., Crothers, 1972, Dawes, 1966; Frederiksen, 1972), the role of presuppositions or prior knowledge in comprehension (e.g., Bransford & Johnson, 1972; Freedle & Carroll, 1972), and what it means to comprehend (e.g., Perfetti, in press) will eventually permit us to understand reading comprehension processes and their disruption. A promising methodological trend to observe on-line reading (Rayner, 1975) may provide useful observational data to verify theoretical or empirical assertions.

Clearly, reading comprehension requires an active, attentive, and selective reader who, to some extent, operates independently of text to extract meaning from it. Inadequate reading comprehension seems to imply being more a slave to the actual printed word and a failure to extract structure and organization from text. Hopefully, future work in this area will specify the nature of the interaction between components of the reading comprehension process, thereby providing a theoretical and empirical base for remediation efforts.

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